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FOREST PEST MANAGEMENT

BIOLOGICAL EVALUATION R2-82-5

SPRUCE BEETLE

Little Horn Area, Bighorn
National Forest, 1982

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United States
Department of

Forest Service

Forest Pest Management
Denver, Colorado

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Little Horn Area, Bighorn
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INTRODUCTION

Three sale units were harvested using the shelterwood method in the Little Horn Area, Medicine Wheel Ranger District, Bighorn National Forest from 1974-77. Logging residuals, left in place during the harvesting period, were infested by spruce beetle, *Dendroctonus rufipennis* (Kirby). Since 1977 the spruce beetle has sustained populations in blowdown and standing green spruce, *Picea engelmannii* Parry throughout the cut blocks in the Little Horn Area. Spruce beetle activity was not noted in surrounding spruce stands.

TECHNICAL INFORMATION

The original cut blocks were surveyed by Bighorn National Forest personnel in the fall of 1981. Forty 1/4-acre fixed plots were allocated within 3 proposed sale units. Table 1 provides a summary of stand parameters by unit.

Each sale unit was rated for risk to spruce beetle infestation by Forest Pest Management (Schmid & Frye 1976). Four parameters were evaluated:

1. Physiographic location
2. Average diameter of live spruce above 10 inches d.b.h.
3. Basal area
4. Proportion of spruce in canopy

Table 1. Stand parameters by proposed sale unit, Little Horn Area, Bighorn National Forest, 1982.

Unit No.	No. Plots	Tree[1/] Diameter (d.b.h.-inches)	Basal Area [1/] (sq. ft./ac.)	Approximate Proportion Spruce %	Stand [2/] Risk
1	5	18.4 ± 8.2	8.1 ± 18.3	60-70	Medium
2	20	17.0 ± 2.0	6.7 ± 3.5	60-70	Medium
3	15	20.9 ± 3.0	5.8 ± 4.8	60-70	Medium

1/
$\bar{x} \pm t.05\ SE$

2/
Schmid & Frye 1976

Each parameter was assigned a risk value (Table 2). The sum of the risk values provided the overall Potential Outbreak Rating:

Stand Risk Value	Potential Outbreak Rating
11-12	High
7-9	Medium
4-5	Low

Using this procedure, each of the proposed sale units were determined to have a potential outbreak rating of Medium.

DISCUSSION

Spruce beetle populations should continue to infest high risk trees and blowdown in the Little Horn Area at low to endemic levels. Should extensive blowdown occur in the area, the potential for an epidemic would increase substantially. To reduce the potential for spruce beetle outbreak in the Little Horn Area, three steps are recommended:

1. Treat spruce beetle infested trees
2. Survey spruce stands in the Little Horn Area and determine the potential for outbreak on a stand-by-stand basis
3. Harvest all Medium to High potential stands.

ALTERNATIVES

The following alternatives or combinations of alternatives should be considered in spruce management plans for the Little Horn Area:

- Short Term -

1. Do Nothing. Under this alternative a substantial loss of the spruce resource would be accepted by the land manager. The potential for spruce beetle outbreak in adjacent spruce stands appears to be in the medium to high risk catagory. A survey, as suggested above, needs to be conducted to confirm stand risk. An extensive blowdown in the Little Horn Area could easily trigger a substantial outbreak.

2. Treat currently infested trees. Under this alternative, currently infested trees would be treated chemically or mechanically to suppress spruce beetle populations.

   a. Chemical treatment. All currently infested trees would be felled, bucked and treated with an EPA registered pesticide.[1]

[1] Contact Forest Pest Management for an update on registered pesticides.

Table 2

Risk categories for potential spruce beetle outbreaks for each stand characteristic

Risk category[1]	Physiographic location	Average diameter of live spruce above 10 inches d.b.h.	Basal area	Proportion of spruce in canopy
		Inches d.b.h.	*Ft^2*	*Percent*
HIGH (3)	Spruce on well-drained sites in creek bottoms	>16	>150	>65
MEDIUM (2)	Spruce on sites with site index of 80 to 120	12-16	100-150	50-65
LOW (1)	Spruce on sites with site index of 40 to 80	<12	<100	<50

[1] Number in parentheses indicates arbitrary value to be used in calculating stand priority, and is used only for convenience.

b. Mechanical treatment. All currently infested trees would be felled and bucked and (1) placed in the sun to dry the cambium. Logs must be turned periodically to expose the entire bark surface to solar insulation; (2) removed from the area and sawed. Slab ends should be exposed to solar insulation to promote cambial drying.

3. Provide trap trees. Under this alternative, green uninfested spruce would be felled and left in place to trap emerging spruce beetles. There are three major problems with trap trees:

a. There are no sound recommendations for the number of trap trees required to "trap out" a spruce beetle population.

b. Trap trees concentrate beetle populations in a relatively small area. The beetles not absorbed by the trap trees may infest standing green trees and provide the needed impetus for an outbreak.

c. The trap tree method is based on the assumption that the spruce beetle population in the area can be reduced to near zero -- "trapped out". Since this assumption has not been demonstrated use of trap trees provides an unnecessary risk.

- Long Term -

1. Survey all spruce stands in the Little Horn Area. Under this alternative all stands in the Little Horn Area would be surveyed and outbreak potential determined. Risk rating methods are outlined by Schmid & Frye 1976 and Logan et al 1980.

2. Harvest all medium to high susceptibility stands as a first priority. Guidelines for minimizing spruce beetle populations in logging residuals are discussed by Schmid (1977).

REFERENCES CITED

1. LOGAN, J. A., J. M. SCHMID, and M. S. MEHL. 1980. A computer program to calculate the susceptibility of spruce-fir stands to spruce beetle outbreaks. USDA For. Serv. Res. Note RM-393, 7 pp.

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3. SCHMID, J. M. and R. H. FRYE. 1976. Stand ratings for spruce beetles. USDA For. Serv. Res. Note RM-309, 4 pp.